this new service. To the extent that non-profit organizations determine that LEO satellite systems offer a practical communications platform to develop new or special applications or services to their constituents, they will necessarily have to develop an overall budget and financing plan for the entire program.[77] When such a program is developed, Constellation can work with the program manager to develop an economically optimum approach to providing space segment capacity to the program. If LEO system operators fail to provide reasonable access to space segment capacity once non-profit organizations develop specific applications or services that require LEO satellite systems, the Commission has sufficient regulatory authority to investigate any abuses and impose the appropriate remedies.

X. Conclusion

As the Commission recognizes in its Notice, this proceeding has the potential for establishing the regulatory basis for the introduction of a broadbased offering of new mobile satellite services on a global basis. The authorization of the proposed new LEO satellite systems in the 1.6/2.4 GHz bands would not only provide a new range of advanced, low cost satellite services to the American consumer, but would also allow the establishment of a truly competitive MSS

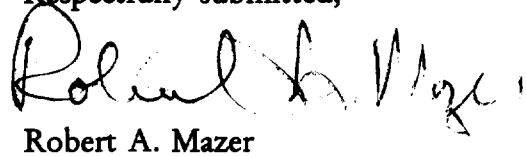
[77] Unlike domsats, where satellite transponders can be operated independently of ground segment operators who simply buy or lease transponders to establish their own end-to-end networks, gateway earth stations and waveform definitions are an integral part of LEO system architecture and satellite capacity can not be arbitrarily separated from the gateways and specified waveform. In the absence of a technical requirements definition, it is not clear how a LEO system would satisfy any unique applications of non-profit organizations.

industry in this country. Moreover, by restricting access to the 1.6/2.4 GHz bands to LEO systems, the Commission can insure that this technology will be applied on a global basis and provide United States companies with the leadership position in establishing the global organizations that will be necessary to finance and operate the multiple LEO MSS systems contemplated by the current applications before the Commission. The Commission's proposed frequency assignment plan could form the basis for an agreement among the applicants to eliminate any potential mutual exclusivity and avoid the need to establish alternative administrative selection procedures, provided that certain clarifications and modifications are made as set forth in Section IV.C above.

The inability of the Commission to assign the 5.1 GHz feeder link band to space stations operating in the 1.6/2.4 GHz MSS service will have an adverse impact on the cost and operations of Constellation's system, particularly if Ka-Band feeder links had to be employed. Constellation therefore urges the Commission to make every effort to either make the C-Band RDSS band available or to find another set of feeder link bands between 3 and 15 GHz.

Finally, Constellation supports the adoption of the rules proposed in the Notice with the specific changes described above and in Appendix A.

Respectfully submitted,



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May 5, 1994

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CERTIFICATE OF SERVICE

I, Robert A. Mazer, hereby certify that a copy of the foregoing document was served by first-class mail, postage prepaid, this 5th day of May, 1994 on the following persons:

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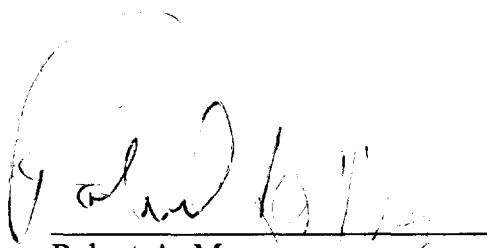

Robert A. Mazer

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APPENDIX A

PROPOSED RULE

TEXT MODIFICATIONS

Appendix A

PROPOSED RULE TEXT MODIFICATIONS

The following modifications are proposed to the rule texts contained in Appendix A to the Commission's Notice of Proposed Rulemaking in CC Docket No. 92-166, FCC 94-11 (released February 18, 1994):

1. **§25.115 Applications for earth stations authorizations.**

(d) * * * *

(3) A Form 493 for each fixed-gateway, TT&C or Network Control Center station operating with the network if not already licensed under this subpart.

Reason: To avoid repetitive filing of Forms 493 with every transceiver blanket application, particularly if not operated by the transceiver blanket licensee, and to clarify that gateway, TT&C and Network Control Center earth stations can be licensed separately under normal earth station application procedures.

2. **§25.130 License term and renewals.**

* * * * *

(e) Renewal of licenses. Applications for renewals of earth station license must be submitted on FCC Form 405 (Application for Renewal of Radio Station License in Specified Services) no earlier than 90 days, and no later than 30 days, before the expiration date of the license. Applications for space station system replacement authorization for non-geostationary orbit satellites shall be filed no earlier than 90 days, and no later than 30 days, prior to the end of the seventh year of the existing license term, or at an earlier date if required to be filed by a cut-off date specified by the Commission with respect to a potentially mutually exclusive satellite system application or renewal.

Reason: To allow flexibility for a renewal application for a 1.6/2.4 GHz MSS system to be filed at an earlier date than the normal filing window if the Commission establishes an application cut-off date.

3. §25.136 **Operating provisions for earth station networks in the 1.6/2.4 GHz mobile-satellite service**

* * * * *

(b) User transceiver units in this service are authorized to communicate with and through U.S. authorized space stations only. No person shall transmit to a space station unless the user transceiver ~~specific transmission~~ is first authorized by the space station licensee or by a service vendor authorized by that licensee, and the specific transmission is conducted in accordance with the operating protocol specified by the system operator.

Reason: To clarify the relationship between "commissioning" or "registering" a user transceiver in general and the protocol that controls individual "specific" transmissions by that user transceiver.

4. §25.143 **Licensing provisions for the 1.6/2.4 GHz Mobile-Satellite Service**

(a) System License: Applicants authorized to construct and launch a system of ~~technically identical~~ non-geostationary satellite orbit satellites will be awarded a single "blanket" license covering the operation of a specified number of space stations with identical particulars of operation.

Reason: The term "technically identical" is too restrictive if literally applied in terms of allowing technological advances to be incorporated into later satellites in the system, and could lead to confusion and unnecessary controversy if literally applied. The term "particulars of operation" has a well defined meaning and focuses on the real issue of insuring identical spectrum use by each satellite covered by the blanket license. Clarification of "blanket" license concept to replacement and in-orbit spare satellites is also required.

(b) Qualification Requirements.

(1) * * * * *

(2) Technical Qualifications: In addition to providing the information specified in (b)(1), each applicant shall demonstrate the following:

(i) * * * * *

(ii) that the proposed system is capable of providing ~~mobile satellite services to~~ coverage of all areas of the world, with the exception of

the polar regions above 65° north and below 65° south latitudes, ~~at least 75% of every 24-hour period, i.e., that~~ with at least one satellite ~~will be~~ visible above the horizon at an elevation angle of at least 5° for at least 18 hours each day;

Reason: To remove ambiguity in the specific technical showing required by the applicant.

(iii) that the proposed system is capable of providing ~~voice service~~ coverage on a continuous basis throughout the U. S.~~, i.e., that~~ with at least one satellite ~~will be~~ visible above the horizon at an elevation angle of at least 5° at any point within the United States at all times;

Reason: To remove ambiguity in the specific technical showing required by the applicant.

(iv) that operations ~~will not cause unacceptable interference to other authorized users of the spectrum. In particular, each application shall demonstrate that~~ of the proposed space station(s) comply with the requirements specified in §25.213.

Reason: "Unacceptable" interference is a unilaterally asserted requirement by a single service, not a mutually agreed level between two services sharing a band. A space station applicant can not be reasonably expected to demonstrate absence of "unacceptable" interference prior to completion of coordination, and coordination can not begin until after the application is filed. Reference only to the clearly demonstrable sharing criteria specified in §25.213 removes ambiguity from the specific showing required of applicants.

* * * *

(c) Replacement of Space Stations Within the System License Term. Licensees of non-geostationary 1.6/2.4 GHz mobile-satellite systems authorized through a blanket license pursuant to paragraph (a) of this section need not file separate applications to construct, launch and operate ~~technically identical~~ replacement or in-orbit spare satellites with identical particulars of operation within the term of the system authorization.

Reason: As stated under the proposed changes to paragraph (a) above.

5. §25.203 **Choice of sites and frequencies.**

* * * * *

(j) Applicants for non-geostationary 1.6/2.4 GHz Mobile-Satellite Service / radiodetermination satellite service feeder links ~~outside the bands specified in § 25.202(a)(5)~~ in the bands 18.8-20.2 GHz and 27.5-30.0 GHz shall indicate the frequencies and spacecraft antenna gain contours towards each feeder-link earth station location and will coordinate with licensees of other fixed-satellite service and terrestrial-service systems sharing the band to determine geographic protection areas around each non-geostationary mobile-satellite service / radiodetermination satellite service feeder link earth station.

Reason: To conform text to the recommendation of §5.1.3 (e) of the NRM Report since this information is only relevant to space stations operating Ka-band feeder links with steerable, narrow beam antennas.

(k) An applicant for ~~a non-geostationary space station or~~ an earth station that will operate with a geostationary satellite or non-geostationary satellite in a shared frequency band in which the non-geostationary system is (or is proposed to be) licensed for feeder links, shall demonstrate in its application that its proposed ~~space or~~ earth station will not cause unacceptable interference to any other satellite network that is authorized to operate in the same frequency band, or certify that the operations of its ~~space or~~ earth station shall conform to established coordination agreements between the operator(s) of the space station(s) with which the earth station is to communicate and the operator(s) of any other space station licensed to use the band.

Reason: To conform text to the recommendation of § 5.1.3(f) of the NRM Report because it is confusing to include a space station requirement in a rule section that deals only with earth stations and because this requirement is already covered by this proposed §25.278.

6. §25.213 **Inter-service ~~coordination requirements for~~ sharing criteria applicable to the 1.6/2.4 GHz Mobile Satellite Service**

Reason: To clarify the contents of this rule section.

(a) Protection of the radio astronomy service against interference from mobile-satellite service systems in the 1610.6-1613.8 MHz band.

(1) Protection zones. All 1.6/2.4 GHz Mobile-Satellite Service systems shall be capable of determining the position of the user transceivers accessing the space segment in the 1610.6-1613.8 MHz band through either internal radio determination calculations or external sources such as LORAN-C or the Global Positioning System. * * * * *

Reason: There is no reason to require transceivers in the mobile-satellite service which do not operate in the radio astronomy band to incur the cost of including a position determination capability.

Note: Subparagraphs (iv) - (vii) can be renumbered (2) - (5) as a result of the deletion of (2) - (3) in the proposed rules.

~~(2) Mobile-satellite service space stations transmitting in the 1613.8-1626.5 MHz band shall limit out-of-band emissions so as not to exceed -238 dB (W/m²/Hz) during observations at the facilities listed in paragraph (a)(1)(i) of this section and -198 dB (W/m²/Hz) during observations at the facilities listed in paragraph (a)(1)(ii) of this section.~~

Reason: This paragraph should be deleted in its entirety since specific levels of "unacceptable" interference should not be codified into the rules unless mutually acceptable to both services sharing the band. This is not the case for the protection levels being specified in this paragraph.

~~(3) Mobile-satellite service space stations operating in the 2483.5-2500 MHz band shall limit spurious emission levels in the 4990-5000 MHz band so as not to exceed -241 dB (W/m²/Hz) at the surface of the earth.~~

Reason: This paragraph should be deleted in its entirety since specific levels of "unacceptable" interference should not be codified into the rules unless mutually acceptable to both services sharing the band. This is not the case for the protection levels being specified in this paragraph.

(b) * * * * *

(c) Protection of aeronautical radionavigation systems operating pursuant to International Radio Regulation RR 732.

(1) Mobile-satellite earth stations transmitting in the 1610-1626.5 MHz band shall limit e.i.r.p. levels to no greater than -15 dB (W/4 kHz) on frequencies being used by systems operating in accordance with International Radio Regulation RR 732, and to no greater than -3 dB (W/4 kHz) on frequencies that are not so being used.

~~Pursuant to RR 731E and 731F, all mobile satellite operations in the 1610-1626.5 MHz band (both Earth-to-space and space-to-Earth) must be coordinated with systems operating pursuant to RR 732. Such mobile satellite systems shall not cause harmful interference to, or claim protection from, stations in the aeronautical radionavigation service and stations operating pursuant to RR 732.~~

Reason: The Commission should not prejudge the results of international coordination by specifying showing requirements on applicants that can only be demonstrated after international coordination is completed. The Commission should not impose allocation provisions in specific service rules that duplicate provisions in §2.106 of the Commission's rules affecting relationships between co-primary services and which will be clarified in specific operational terms as a result of the international coordination process yet to be completed.

~~(2) Airborne 1.6/2.4 Mobile Satellite Service earth stations shall not operate on civil aircraft unless the earth station has a direct physical connection to the aircraft cabin communication system.~~

Reason: This sub-paragraph should be deleted because it duplicates §25.136(a) and §25.136(a) is the proper place for this provision since it deals with the installation of user transceivers rather than with inter-service sharing criteria.

~~(3)~~ (2) * * * * *

~~(d) Protection from fixed stations operating pursuant to International Radio Regulation RR 730. Pursuant to RR 731E, all mobile satellite operations in the 1610-1626.5 MHz band (both Earth-to-space and space-to-Earth) must be coordinated with systems operated pursuant to RR 730. All such mobile satellite stations shall not cause harmful interference to , or claim protection from, stations in the fixed service operating pursuant to RR 730.~~

Reason: The Commission should not prejudge the results of international coordination by specifying showing requirements on applicants that can only be demonstrated after international coordination is completed. The Commission should not impose allocation provisions in specific service rules that duplicate provisions in §2.106 of the Commission's rules affecting relationships between co-primary services and which will be clarified in specific operational terms as a result of the international coordination process yet to be completed.

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APPENDIX A

PROPOSED RULE

TEXT MODIFICATIONS

Appendix A

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Reason: As stated under the proposed changes to paragraph (a) above.

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(b) * * * * *

(c) Protection of aeronautical radionavigation systems operating pursuant to International Radio Regulation RR 732.

(1) Mobile-satellite earth stations transmitting in the 1610-1626.5 MHz band shall limit e.i.r.p. levels to no greater than -15 dB (W/4 kHz) on frequencies being used by systems operating in accordance with International Radio Regulation RR 732, and to no greater than -3 dB (W/4 kHz) on frequencies that are not so being used.

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Reason: The Commission should not prejudge the results of international coordination by specifying showing requirements on applicants that can only be demonstrated after international coordination is completed. The Commission should not impose allocation provisions in specific service rules that duplicate provisions in §2.106 of the Commission's rules affecting relationships between co-primary services and which will be clarified in specific operational terms as a result of the international coordination process yet to be completed.

~~(2) Airborne 1.6/2.4 Mobile Satellite Service earth stations shall not operate on civil aircraft unless the earth station has a direct physical connection to the aircraft cabin communication system.~~

Reason: This sub-paragraph should be deleted because it duplicates §25.136(a) and §25.136(a) is the proper place for this provision since it deals with the installation of user transceivers rather than with inter-service sharing criteria.

~~(3)~~ (2) * * * * *

~~(d) Protection from fixed stations operating pursuant to International Radio Regulation RR 730. Pursuant to RR 731E, all mobile satellite operations in the 1610-1626.5 MHz band (both Earth-to-space and space-to-Earth) must be coordinated with systems operated pursuant to RR 730. All such mobile satellite stations shall not cause harmful interference to , or claim protection from, stations in the fixed service operating pursuant to RR 730.~~

Reason: The Commission should not prejudge the results of international coordination by specifying showing requirements on applicants that can only be demonstrated after international coordination is completed. The Commission should not impose allocation provisions in specific service rules that duplicate provisions in §2.106 of the Commission's rules affecting relationships between co-primary services and which will be clarified in specific operational terms as a result of the international coordination process yet to be completed.

APPENDIX B

IMPACT OF THE PROPOSED L-BAND FREQUENCY SHARING ASSIGNMENT PLAN ON THE CONSTELLATION SYSTEM

Appendix B

IMPACT OF THE PROPOSED L-BAND FREQUENCY SHARING ASSIGNMENT PLAN ON THE CONSTELLATION SATELLITE SYSTEM

1. Introduction and Summary

Constellation's original low earth orbit (LEO) system design described in its June 1991 application proposed the use of a 2 MHz segment of the 1610-1626.5 MHz band (i.e. 1624.5-1626.5 MHz) on an exclusive basis for uplinks from user terminals, and the use of the 2483.5-2500 MHz band on a shared basis for downlinks to user terminals. That system had a very limited channel capacity. Since then, the Constellation system design has been undergoing continuous review with the view of increasing system capacity and spectrum efficiency, and of operating in a frequency sharing environment with other services and other LEO systems. This includes the use of code division multiple access (CDMA) techniques in both the inbound and outbound links. For the purpose of this appendix, Constellation uses a 1,000 voice channel baseline design occupying 2.56 MHz of L/S-band spectrum assuming no interference from any other satellite system in this 2.56 MHz band.

The objective of this appendix is to analyze the impact on Constellation's space segment under the L-Band frequency plan proposed by the Commission in its Notice of Proposed Rule Making in CC Docket No. 92-166. The capacity analyses in this appendix follow directly from the capacity analyses in the Final Report of the Majority of Informal Working Group 1 to the Negotiated